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(71) Applicant(s)

MSS Clean Technology Limited
(Incorporated in the United Kingdom)
Frederick House, Fulford Road, YORK, YO1 4EG,
United Kingdom

(72) Inventor(s)

Brian David Godson
Christopher Hale

(74) Agent and/or Address for Service

Forrester Ketley & Co
Chamberlain House, Paradise Place, BIRMINGHAM,
B3 3HP, United Kingdom

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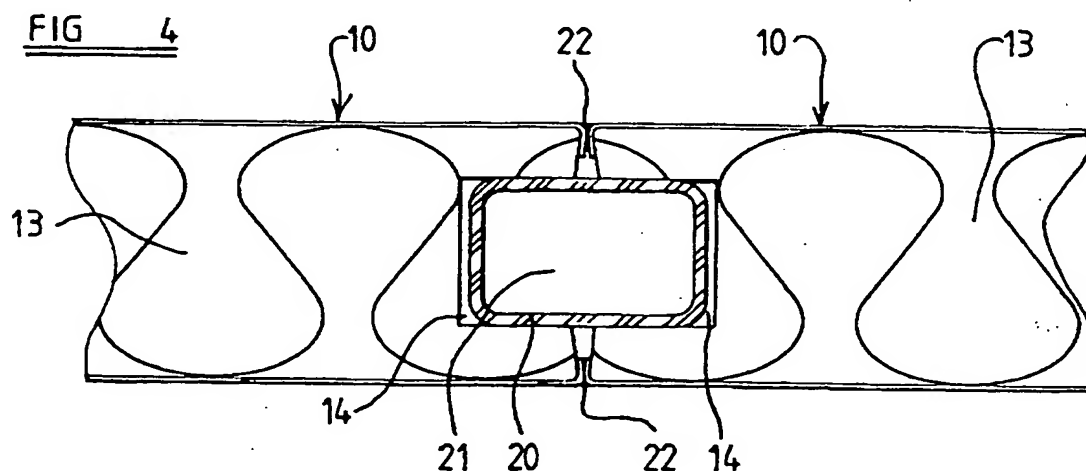
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(54) Abstract Title

Frameless panel

(57) A frameless panel has an inner and outer skin (10), separated by intermediate layer (13) which is provided with a groove (14) on at least a pair of opposed edges of the panel. The skin (10) can include a steel member and the intermediate layer (13) can be formed from a rigid, fire resistant, plastic material or an aluminium honeycomb. A means of connecting the panels is provided in the form of a connector having a tongue (20), which is received in the grooves (14) of the panels. The tongue (20) may be made from aluminium or electrically insulating, fire resistant plastic. The panels can be used to form an internal structure of a building (fig 13), which entails the use of seals.



At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 1995

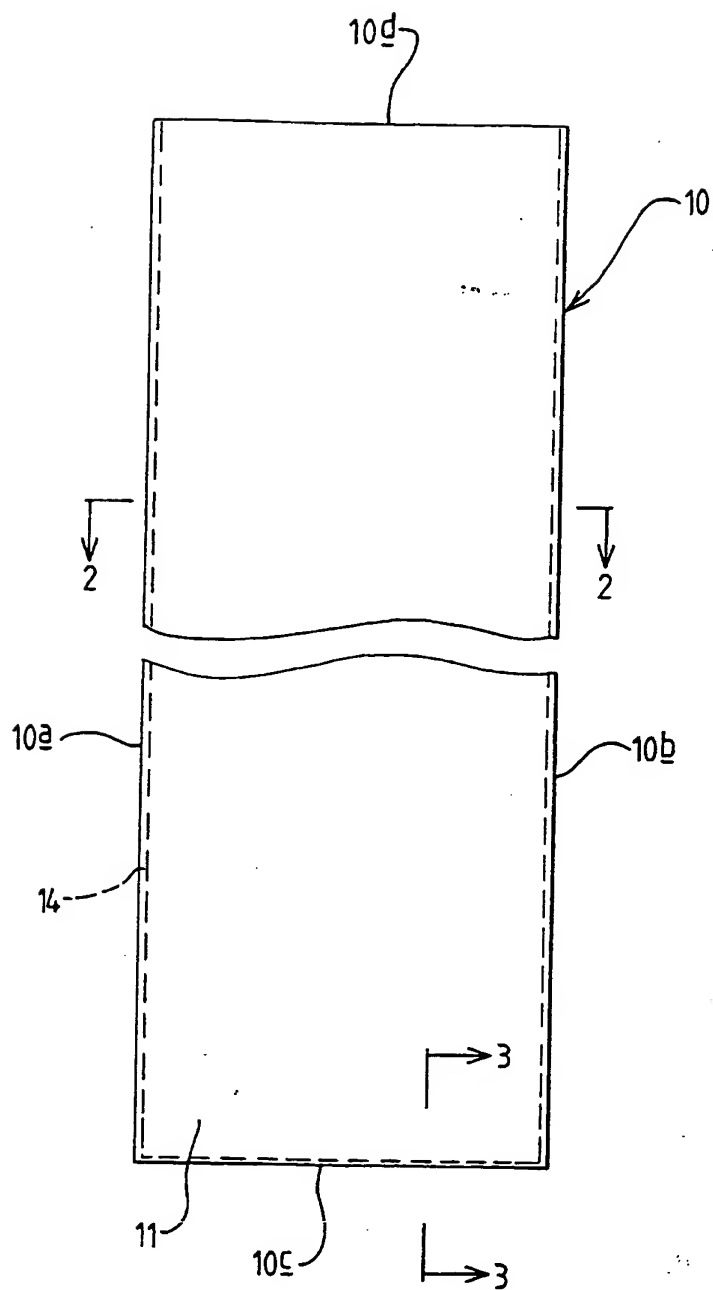


FIG 1

FIG 2

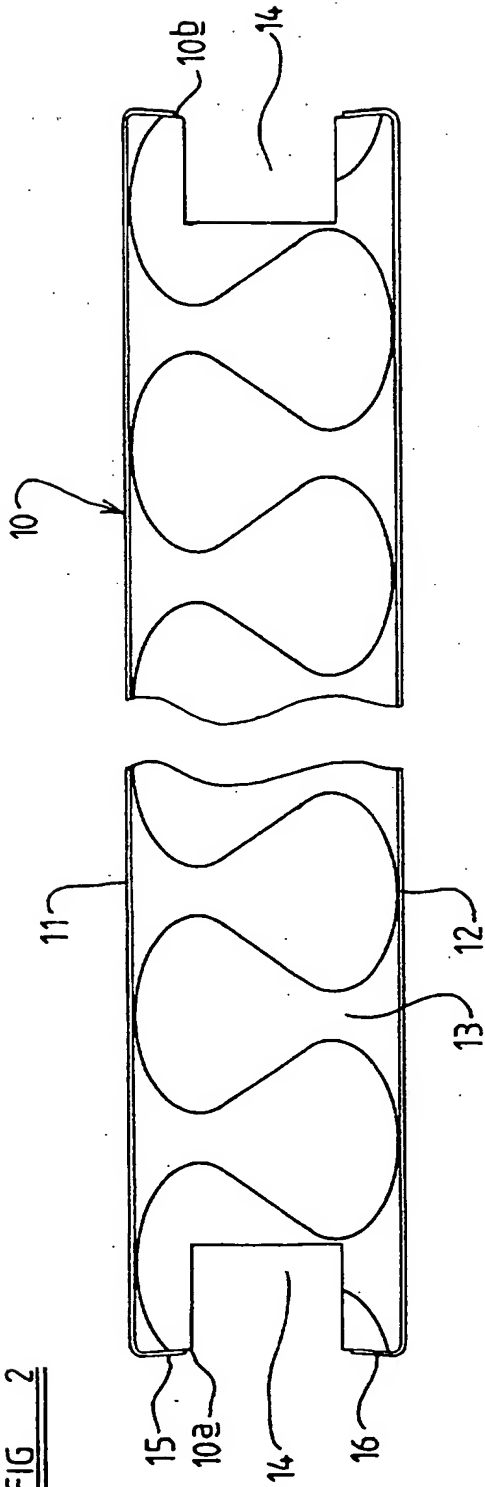


FIG 3

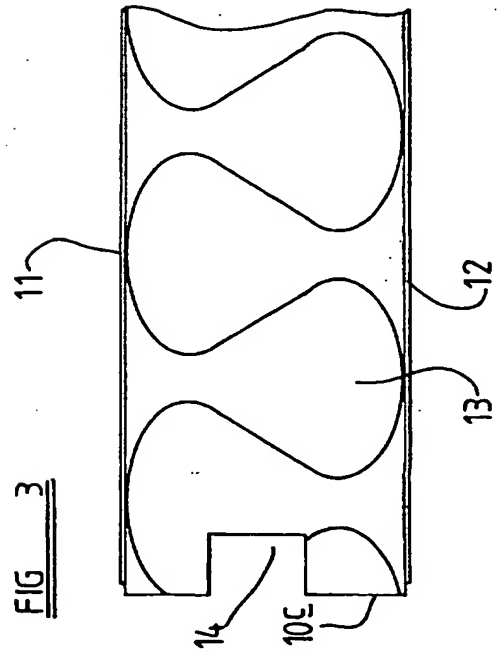


FIG 4

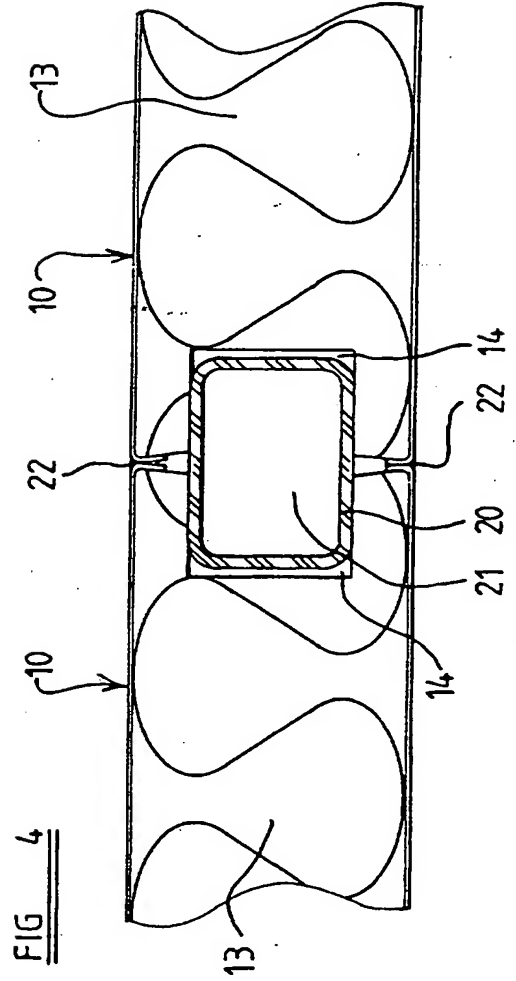


FIG 5

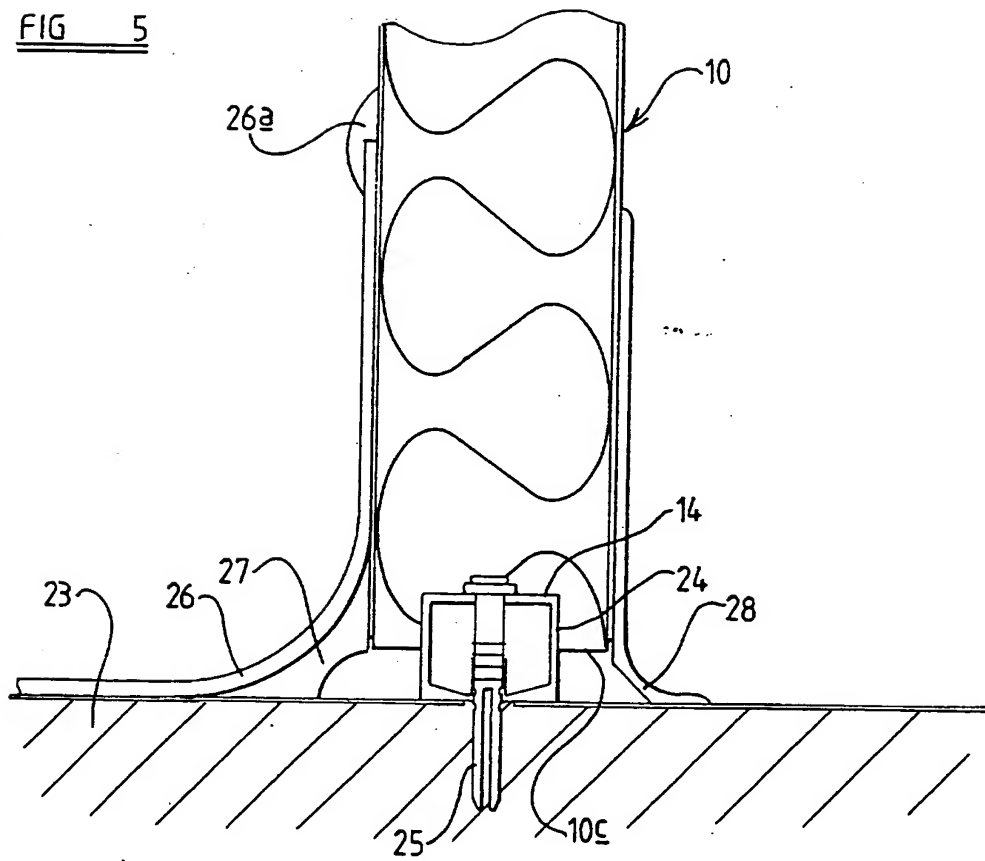
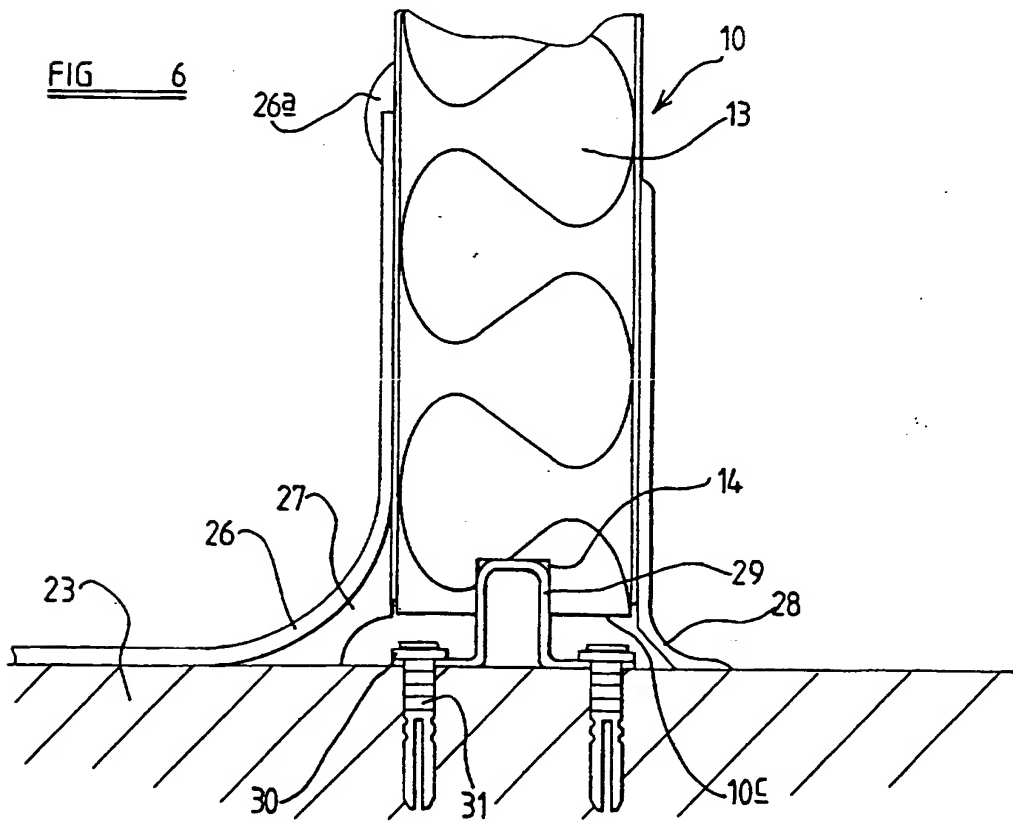


FIG 6



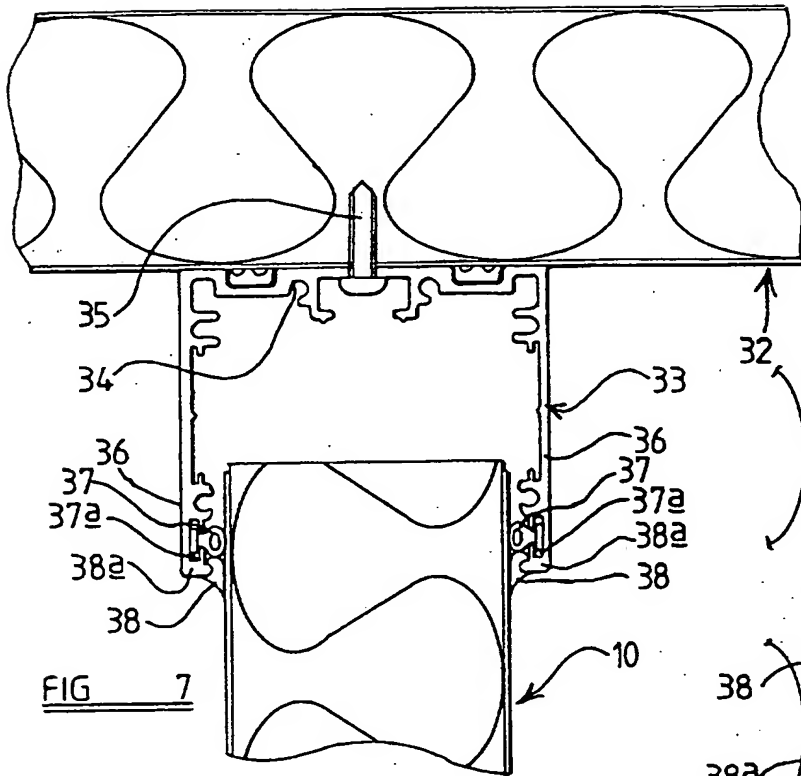


FIG 7

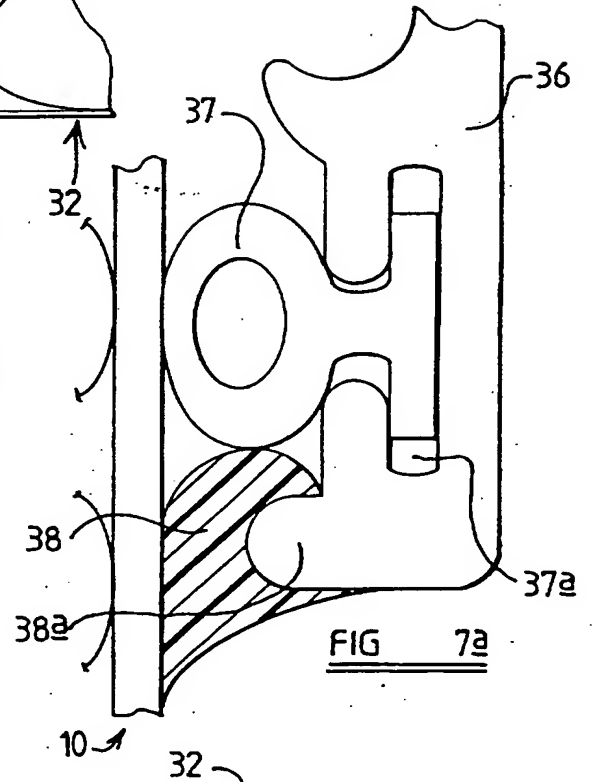
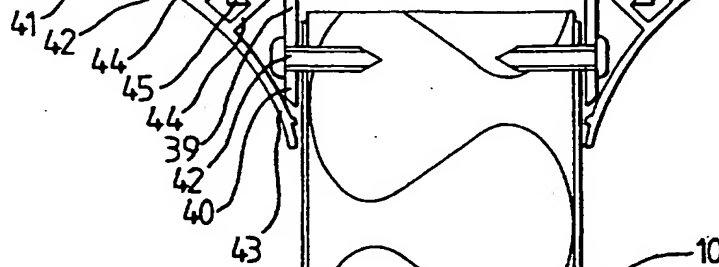
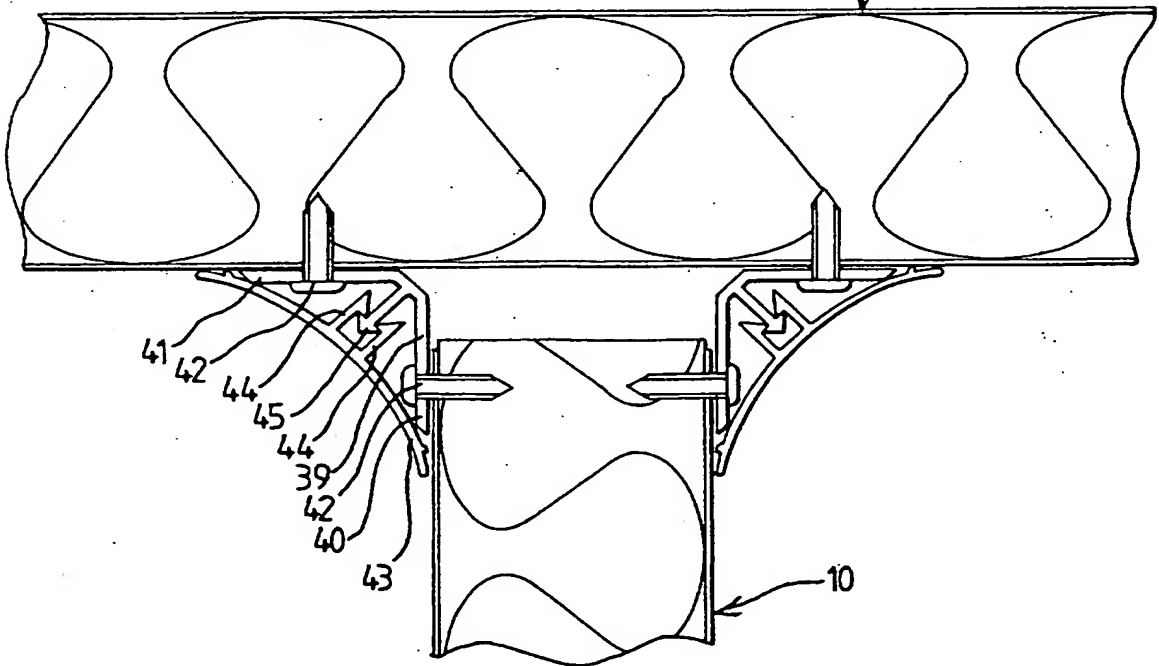


FIG 7a

FIG 8



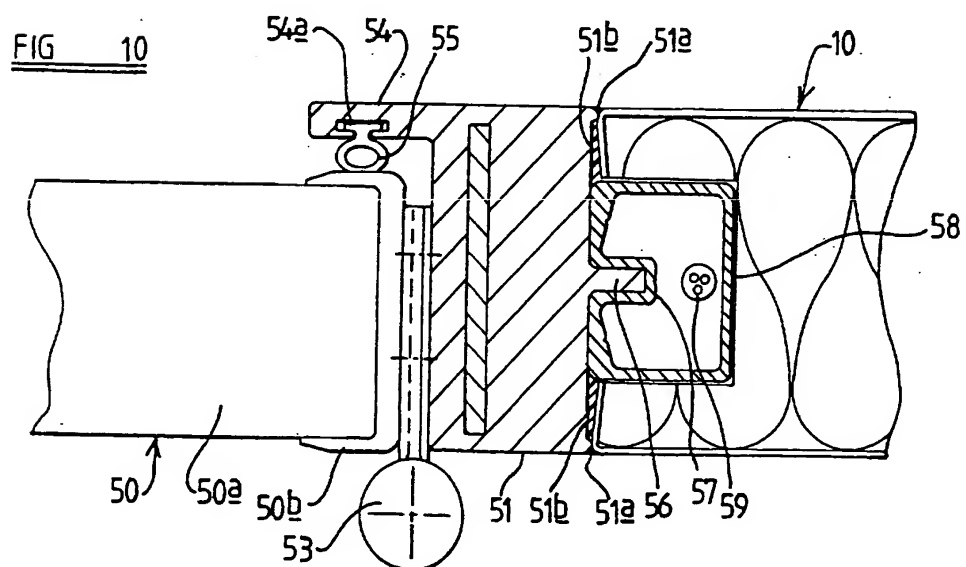
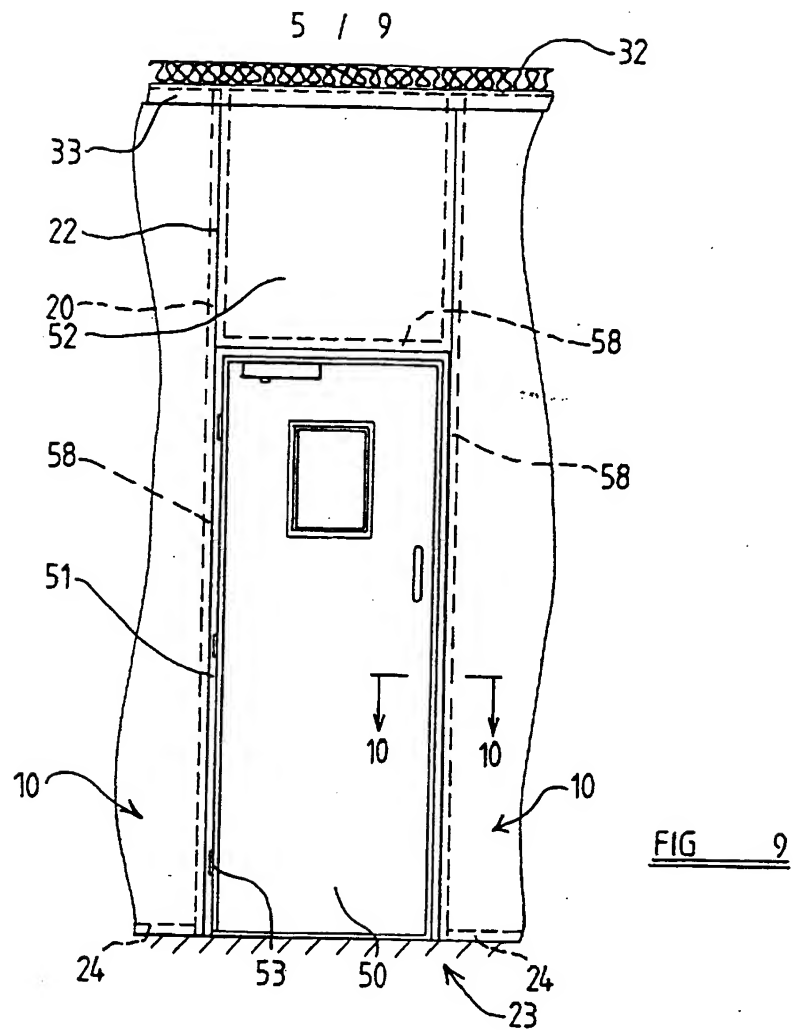


FIG 11

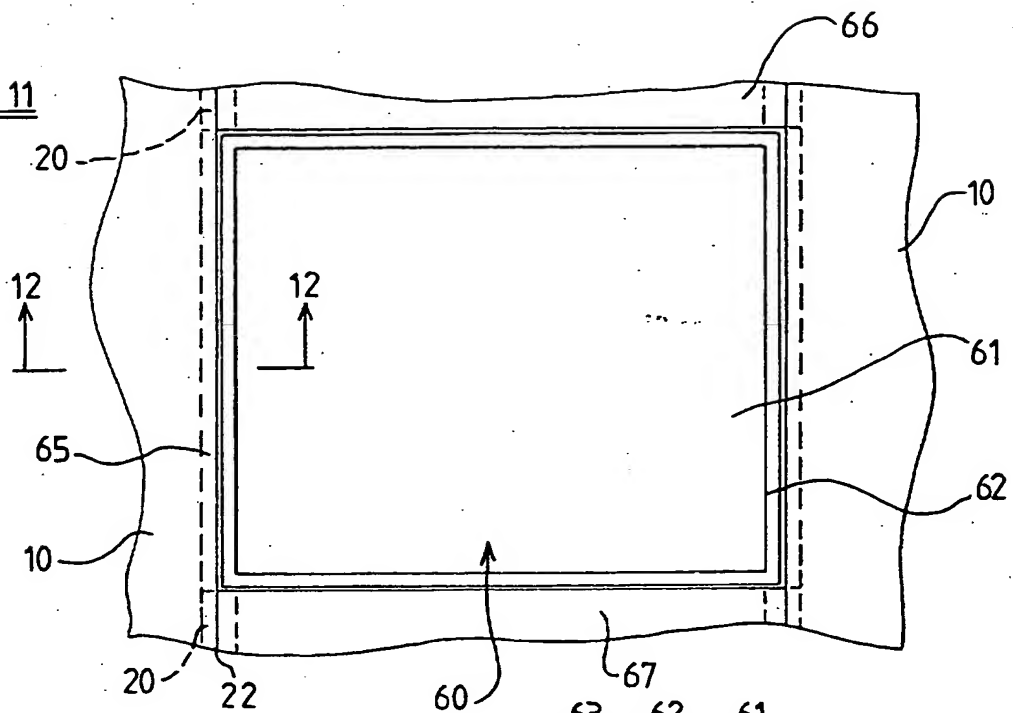
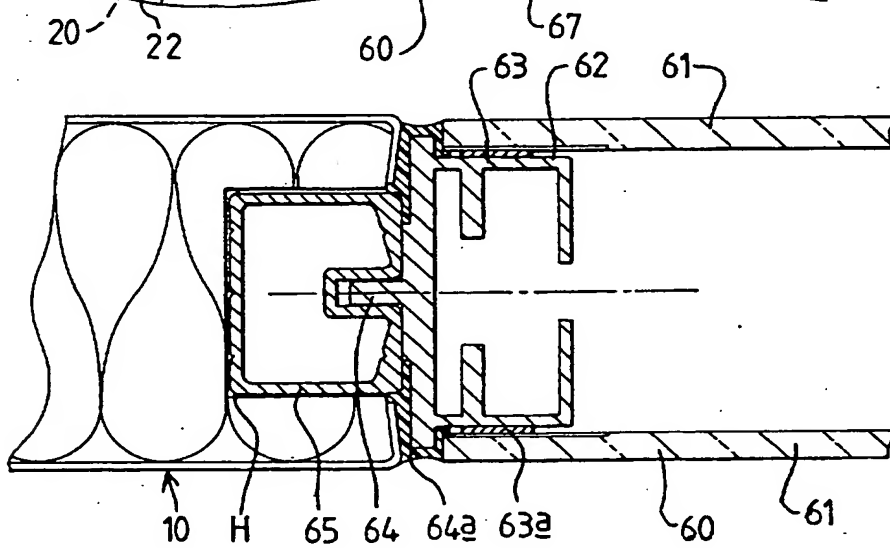


FIG 12



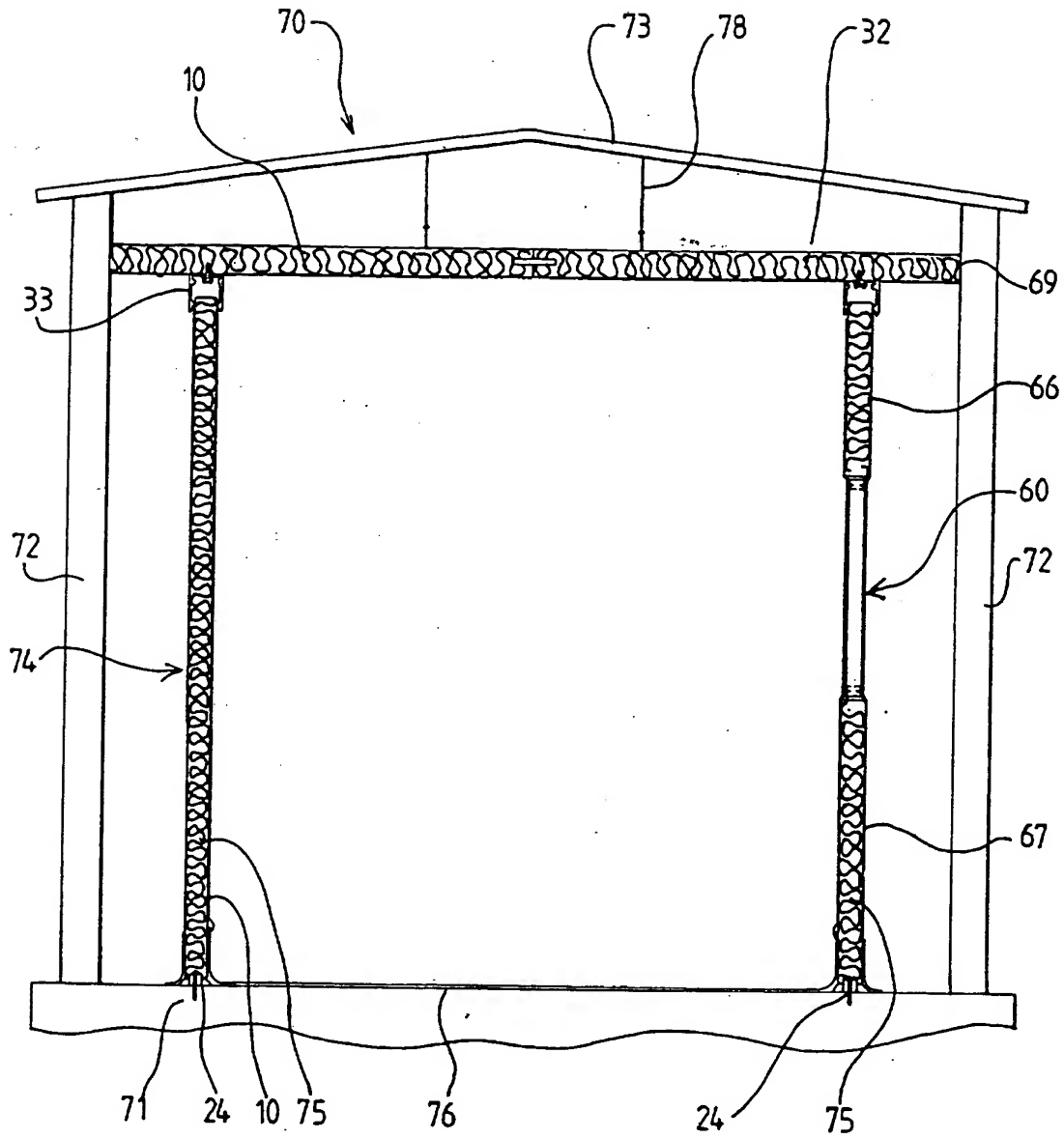


FIG 13

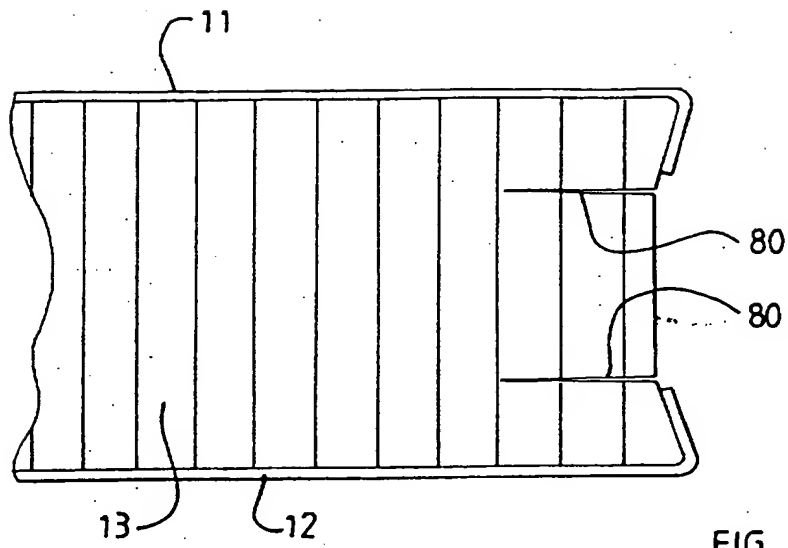


FIG 14

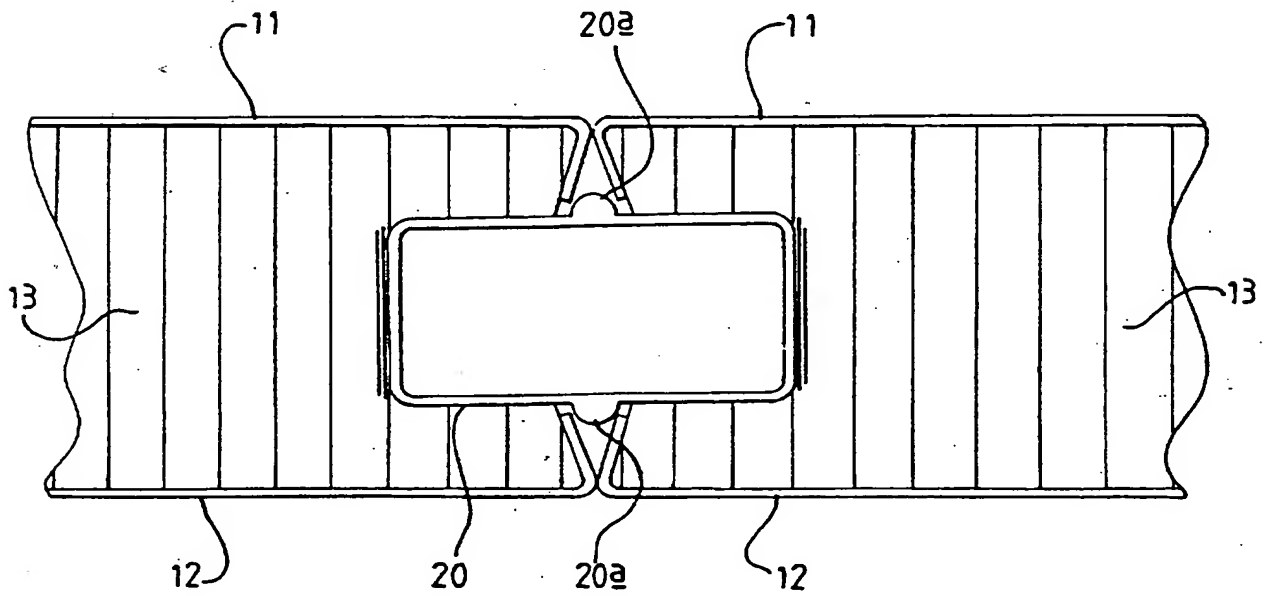


FIG 15

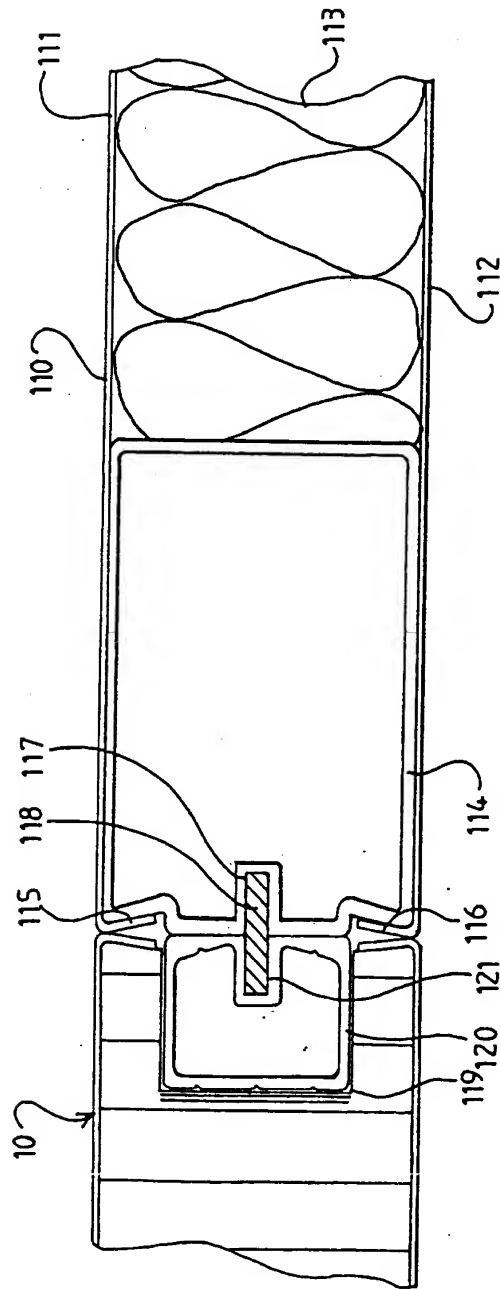


FIG 16

PATENTS ACT 1977

A9720GB

Title: Frameless Panel

Description of Invention

This invention relates to a frameless panel for internal structures in or for a building comprising a structurally autonomous outer shell (as herein defined), a connection means in or for a first panel and a second panel, and to an internal structure in or for a building comprising a structurally autonomous outer shell.

An internal structure may comprise a partition or enclosure, particularly but not exclusively an enclosure within which it is desired to provide a controlled environment. Such a controlled environment may be desirable for a variety of applications, for example in microchip fabrication facilities where it is desirable that the number of particles in the environment is kept to a minimum, or in locations, for example laboratories, where it is desirable to maintain a sterile environment, for example to minimise the number of bacteria present. To meet these requirements, it is preferable that the interior surfaces of the controlled environment have certain characteristics, for example that they are as homogenous and as far as practical have no ledges or recesses which might accommodate bacterial or fungal colonies or accumulate dust. It is also desirable that the controlled environment within the enclosure is as free as is necessary for the intended application from building distribution services, such as pipes, wires or other service trunking, and that the components making up the internal structure may be installed as cheaply and simply as possible.

By "structurally autonomous outer shell" we mean that the outer shell does not require any support from the internal structure but it is entirely self supporting. Where components of the internal structure are secured to the outer shell, the internal structure may of course give some additional strength to the

outer shell, although this is not essential. The structurally autonomous outer shell may of course provide support for the internal structure.

An aim of the present invention is to provide a new or improved frameless panel, and/or connecting means and/or internal structure..

According to a first aspect of the present invention we provide a frameless panel comprising a first skin and a second skin, the first skin and second skin being attached to and separated by an intermediate layer, the intermediate layer being provided with a groove on at least a pair of opposed edges of the panel.

At least one of said first skin and second skin may comprise at least a steel element, and preferably plastic coated steel.

The intermediate layer may comprise a rigid core material. Advantageously, the intermediate layer may be fire resistant and/or non-combustible.

The intermediate layer may comprise a foam plastics material, and most preferably expanded polystyrene foam.

Alternatively, the intermediate layer may comprise an aluminium honeycomb core.

Preferably, a groove extends along at least three edges of the panel.

The grooves extending along different edges of the panel may be of different depths.

At least one of the first skin and the second skin may comprise a return which extends over at least a part of one of the edges of the panel.

The panel may comprise duct means extending along one edge thereof.

According to a second aspect of the invention we provide a connection means for a first panel and a second panel, the panels being located with mutually facing edges adjacent one another, each of said mutually facing edges comprising a groove, the connection means comprising a tongue, a part of said

tongue being received in each of said grooves, to resist transverse displacement of the panels, the tongue being hollow.

A hollow tongue allows services to be fed along the length of the tongue and thus reduces the need for additional service trunking.

The tongue may be made of an electrically insulating material, for example as a synthetic plastics material such as PVC.

Alternatively, the tongue may comprise a fire-resistant and/or non-combustible material, in particular aluminium and most conveniently an aluminium extrusion.

The first panel and the second panel may comprise frameless panels according to the first aspect of the invention.

The first panel and the second panel may be bonded together.

The panels may be bonded together with a bonding material comprising PVC solvent or other flowable sealant.

According to a third aspect of the invention we provide an internal structure in or for a building having a structurally autonomous outer shell, said internal structure comprising a plurality of panels.

At least one of said panels may be a frameless panel according to the first aspect of the invention.

The panels may be connected with a connection means according to the second aspect of the invention.

The internal structure may comprise a wall comprising at least one of said panels, wherein a locating element is attached to a floor of the building and the said locating element is received in a groove disposed along the lower edge of said panel.

The wall may be provided with a skirting as desired.

The internal structure may comprise a ceiling, said ceiling comprising at least one frameless panel.

The wall panel may be received in a head section disposed attached to a ceiling, the head section comprising a generally channel shaped part, the upper surface of the wall panel being received in said head section, wherein a sealing element is disposed between the wall panel and the head section.

The seal may be a wet seal or a dry seal.

The head section may be provided with a retaining structure to maintain the seal in place.

Where the internal structure comprises a wall, a part of the wall adjacent to said ceiling may be provided with coving.

The internal structure may comprise a door or window, the said door or window comprising a frame element having a projection, said projection being receivable in a recess provided on a panel adjacent to said frame to receive said projection.

The recess may be provided within a retaining part disposed within the groove, said retaining part being adapted to receive said projecting part.

The retaining means and the locating means may comprise an element having a hollow cross-section with a recess provided in one face of the element projecting inwardly into the hollow cross-section.

The invention will now be described by way of example only with reference to the accompanying drawings wherein;

Figure 1 shows a frameless panel according to the first aspect of the invention,

Figure 2 is a section on line 2-2 of Figure 1,

Figure 3 is a section on line 3-3 of Figure 1,

Figure 4 is a section through part of a connecting means according to the second aspect of the invention,

Figure 5 shows a part of an internal structure according to the third aspect of the invention,

Figure 6 shows an alternative configuration of the part of the internal structure of Figure 5,

Figure 7 shows a further part of an internal structure according to the third embodiment of the invention,

Figure 7a is an enlarged view of part of the further part of Figure 7,

Figure 8 shows an alternative configuration of the further part of Figure 7,

Figure 9 shows a yet further part of an internal structure according to the third aspect of the invention,

Figure 10 is a section on line 10-10 of Figure 9,

Figure 11 shows another part of an internal structure according to the third aspect of the invention,

Figure 12 is a section on line 12-12 of Figure 11,

Figure 13 is a section through a building having a structurally autonomous outer shell provided with an internal structure according to the third aspect of the invention,

Figure 14 is a section similar to that of Figure 2 but wherein the intermediate layer comprises an aluminium foil honeycomb,

Figure 15 is a section similar to that of Figure 3 but wherein the intermediate layer comprises an aluminium foil honeycomb, and

Figure 16 is a section similar to that of Figure 15 but provided with a duct means.

A frameless panel according to the first aspect of the invention is shown at 10 in Figure 1. As shown in section in Figures 2 and 3, the panel 10 comprises a first skin 11 and a second skin 12 separated by and bonded to an intermediate layer 13. In the present example, the first wall 11 and second wall 12 comprise at least one PVC coated steel element, for example, Stelvetite (RTM) with a thickness of 0.55mm. The intermediate layer 13 comprises a rigid core material, preferably a synthetic plastic foam, for example expanded

polystyrene foam. If desirable the intermediate layer may be fire resistant and/or non-combustible. In the example where the intermediate layer comprises a synthetic plastic foam, the foam may be treated with a fire resistant additive. The intermediate layer may alternatively comprise an aluminium foil honeycomb core which is fire resistant and non-combustible.

Where one skin of a panel 10 does not provide part of an internal surface of an enclosure, for example when it provides the upper surface of a ceiling panel, the skin may comprise some other material, for example, 0.4mm approx. coated steel in place of 0.55mm stelvetite (RTM).

A groove 14 is provided extending along at least one, in the present example three, edges of the panel 10. The groove 14 is provided in the intermediate layer 13. Along the long edges 10a, 10b of the panel 10, the first wall 11 and second wall 12 are provided with returns 15, 16 respectively, which extends over at least a part of the edge of the panel 10, but do not encroach into the groove 14. In the present example, the returns 15, 16 are bent to be at an acute angle of 85° to the first skin 11 or second skin 12. The groove 14 disposed along the lower short edge 10c of the panel 10 is of a lesser depth than the groove 14 along the long edges 10a, 10b as shown in Figure 3. No groove is provided along the upper short edge 10d.

The groove 14 in the present example is provided by routing the intermediate layer 13 prior to bonding the intermediate layer 13 to the first skin 11 or second skin 12, but may be provided by any suitable means as desired. For example, instead of forming the grooves prior to engaging a panel 10 with a tongue 20, in an alternative the panel 10 may be formed initially without a groove as shown in Figure 14. Instead, a pair of cuts 80 may be provided extending inwardly of the intermediate layer 13 from a long edge 10a thereof as shown in Figure 14. The tongue 20 may be pushed into the intermediate layer 13 such that the part of the intermediate layer 13 disposed between the cuts 80 is displaced by the tongue 20 such that the tongue 20 is received within

the intermediate layer 13 as shown in Figure 15. In this alternative, the tongue 20 is preferably provided with lugs 20a extending outwardly thereof such that the lugs 20a engage at least one of the returns 15, 16 and restrict the tongue 20 from being pushed further into the intermediate layer 13. The alternative is particularly applicable to a panel wherein the core comprises an aluminium foil honeycomb core.

Along the short edges 10c, 10d of the panel 10, the intermediate layer 13 extends a short distance beyond the edges of the first skin 11 and second skin 12.

The connection means of the second aspect of the invention as shown in Figure 4 may be used to join a pair of adjacent panels 10. A tongue 20 is used, a part of the tongue 20 being received in the groove 14 of each of the panels 10, to prevent relative lateral displacement of the panels 10. The tongue 20 is provided with a hollow 21 running along its length, which may provide ducting for electrical wires or other services. The tongue 20 is preferably made of rigid PVC but may be made of any other suitable synthetic plastics or other material. Preferably the tongue is made of electrically insulating material so that a single tongue element only is required to provide both lateral location of the panels and electrical insulation of electrical wires within the tongue.

Alternatively, where it is desired to provide a fire resistant connection, the tongue may comprise a suitable fire-resistant and/or non-combustible material, in the present example aluminium and particularly an aluminium extrusion. It is particularly advantageous to use such an aluminium tongue in conjunction with an aluminium foil honeycomb core as hereinbefore described to provide a non-combustible fire resistant structure.

To bond the panels 10 together, a suitable bonding material may be used to form a joint 22 between the panels 10. In the present example, where the first skin 11 and second skin 12 comprise PVC coated steel, the bonding material preferably comprises a suitable PVC solvent which dissolves the PVC

and allows it to reset as a solvent-welded joint. This provides a strong bond between adjacent panels 10 and provides a continuous homogeneous PVC surface extending across adjacent panels 10.

It will be apparent that such a connection means may be used to join two panels, at least one of which is provided with a frame having a suitable groove.

Where it is desired to provide an internal structure according to the third aspect of the invention having a wall made of a plurality of panels 10, as shown in Figure 5 the panels may be mounted on a floor 23 provided as part of a building having a structurally autonomous outer shell as described herein. Locating means comprising anchor means 24 are provided, comprising an elongate element through which fixing means, in the present example appropriate screws, pass and are received into the floor 23. A panel 10 is located on the anchor means 24, the anchor means 24 being received in the groove 14 disposed along the lowest edge 10c of the panel 10. To ensure that there is no exposed cavity at the base of the panel 10, a suitable cover may be provided. For example, a floor covering 26 may be provided which extends along the floor 23 and further extends upward alongside a part of panel 10, supported on a suitable support 27. The upper edge of the covering 26 may be finished by a capping strip 26a. Alternatively, a suitable skirting means 28 may be provided.

In an alternative configuration as shown in Figure 6, the panel 10 may be provided with an alternative anchor means 29 comprising outwardly directed projections 30. Fixing means 31, in the present example in the form of appropriate screws, pass through the projection 30 and are received in the floor 23.

Where a ceiling is provided, a suitable connection may be provided as shown in Figure 7 and 8. As shown in Figure 7 and 8, the ceiling 32 comprises one or more panels which may be according to the first aspect of the invention or of different construction. As shown in Figure 7, the connection between the

ceiling 32 and wall panel 10 comprises a head section. The head section 33 comprises an elongate channel shaped element 34 disposed along the length of the panel 10. The head section 33 is preferably made as an extrusion of a suitable aluminium alloy and is attached to the ceiling 32 by suitable fixing means 35, in the present example screws, passing through the base of the channel shaped element 34. The upper part of the panel 10 is received between arms 36 of the head section 33. A dry seal 37, in the present example a rubber bubble seal is disposed between each arm 36 and the panel 10, a recess 37a being provided in each arm 36 to accommodate each seal 37. Alternatively or in addition a wet seal 38, which comprises a suitable flowable sealant, is provided between the panel 10 and the head section 33. In the present example, the head section is provided with a projection 38a. The projection 38a, dry seal 37 and panel 10 define a recess into which a part of the flowable sealant is received. When the wet seal has set to a non-flowable but flexible condition, a part of the seal 38 is held in the recess to hold the wet seal in place. The wet seal may be omitted for applications where the presence of an unsealed recess between the head section 33 and panel 10 is not a disadvantage.

Such a configuration is able to accommodate any relative movement between the ceiling 32 and the panel 10, resulting from, for example, the movement of the structurally autonomous outer shell within which the internal enclosure is located or of the enclosure, at least prior to the setting of a wet seal if provided. The head section 33 and dry seal 37 also permit a degree of variability in the height of the enclosure during construction, whilst still providing a seal at the head of the wall.

In an alternative arrangement, as shown in Figure 8, the wall panel 10 and ceiling 32 may be connected by brackets 39. Each bracket 39 has a pair of arms 40, 41 at right angles to one another, one of which is disposed adjacent to the panel 10 and the other adjacent to the ceiling 32. The bracket 39 is connected to the panel 10 and ceiling 32 by appropriate fixing means 42, in the

present example screws. A coving element 43 is attached to the joint section 39, in the present example by a pair of displaceable arms 44 which provide a snap fit on a suitable projection 45 provided on the bracket.

It is desirable to provide doors and/or windows in the internal enclosure, and a suitable arrangement is shown in Figures 9 to 12. As shown in Figure 9, a door 50 having a door frame 51 is provided in conjunction with a header panel 32 disposed between the doorframe 51 and a ceiling 32 as shown in Figures 9 and 10. A suitable head connection is provided of the type shown in Figure 7 or Figure 8. Disposed adjacent the door frame 51 are a pair of panels 10, as shown in Figure 1, mounted on a floor 23 by for example anchor means 24 or 29.

As shown in Figure 10, the door 50 is attached to the door frame 51 by suitable hinges 53. The door 50 comprises a panel section 50a received in an end part 50b to which the hinge 53 is attached. The door frame 51 may comprise a projecting part 54 having a recess 54a for a seal 55 which engages the end part 50b of the door 50 when the door 50 is in a closed position.

To hold the door frame 51 in place, the door frame 51 comprises a projection 56. The projection 56 is located in a recess 57 provided in a retaining part 58 which is disposed in the adjacent groove 14 of the panel 10. The frame 51 is bonded to the adjacent panel 10 by a suitable bond 51a. In the present example, the frame 51 comprises PVC coated steel and a PVC solvent as described hereinbefore is used to provide a solvent welded PVC joint. A suitable sealant 51b is provided in the recess between the frame 51, panel 10 and retaining part 58 to provide additional support. The sealant 51b preferably comprises a material which will not attack the intermediate layer 13. In the present example, the intermediate layer comprises a rigid foam material and the sealant comprises a neutral cure silicone sealant.

Advantageously, the retaining part 58 may be of the same configuration as the anchor means 24 shown in Figure 5. The retaining part 58 is preferably

hollow and may be used as a duct, for example for wires 57. These wires for example comprise wires for an interlock etc, but preferably do not comprise power or data cables. The retaining part 58 is made as an extrusion of a suitable aluminium alloy.

The header panel 52 may be of the same general composition as the panels 10 but is manufactured to a size to be located above the frame 51. The header panel 52 is attached to the adjacent panels 10 by a tongue 20 and solvent welded joint 22 according to the second aspect of the invention. Along its lower edge, the header panel is may similarly provided with a receiving part 58 to receive a projection 56 of the upper part of the door frame 51.

The door may comprise a single door as shown, or a door and a half door, or a double door, or any configuration as may be desired. The configuration of the header panel 52 may be adapted as desired to accommodate the door used. Any suitable construction of a door may be used as desired, for example a laminate or post-formed laminate door.

An example configuration of a window is shown in Figure 11 and Figure 12. The window comprises a pair of toughened glass panes 61 and a frame 62, the frame 62 comprising a spacer 63 which separates the panes 61 and is attached thereto by a suitable seal 63a. The vertical and horizontal edges of the frame 62 are provided with locating projections 64 in the same manner as the projections 56 of the door frame 51 of Figure 10. Along the vertical edges of the frame 62, these locating projections are received in a retaining part 65 disposed in groove 14 of adjacent panels 10. The retaining part 65 is advantageously of the same configuration as the retaining part 58 of Figure 10 and of the anchor means 24 of Figure 5. A suitable flowable sealant 64a is provide to seal between the frame 62 and panel 10 and provide a bond.

Above the window is disposed a header panel 66 leading to a ceiling (not shown) in a like manner as the header panel 52 of Figure 9. Disposed below the window 60 is a lower panel 67 extending between a floor (not

shown) and the window 60. The header panel 66 and lower panel 67 are attached to their adjacent panels 10 by a tongue 20 and solvent welded joints 22 as described herein. A part of the projection 64 along the horizontal edges of the frame 62 is received in the intermediate layer 13 of the header panel 66 and lower panel 67. The projections may simply be pushed into the intermediate layer 13, or a groove may be cut to receive a projection. Alternatively, if desired, in like manner to that shown in Figure 12, grooves may be provided in the header and/or lower panels 66, 67 to receive a retaining part 65 for a projection 64 if desired.

If desired, particularly in a ceiling, the tongue may alternatively comprise a solid tongue of, for example, plywood. The intermediate layer 13 may comprise a rigid core material, preferably a foam plastics material, and most preferably expanded polystyrene foam.

It will be apparent that using a plurality of frameless panels according to first aspect of invention connected where appropriate by connection means according to the second aspect of the invention, an internal structure according to the third aspect of invention can be constructed in any desired one of a number of configurations by the appropriate use of interchangeable and adaptable components including panels, doors, windows and components. The components may be used in conjunction with other building or construction elements of conventional type not described herein.

An illustration of an enclosure provided within a building having a structurally autonomous outer shell is shown in Figure 13. The structurally autonomous outer shell is shown generally at 70 comprising a floor 71, vertically extending walls 72 and a suitable roof structure 73. The autonomous structure 70 is self supporting. Erected within the outer shell 76 is an enclosure 74, in the present example comprising walls 75 comprising panels 10 as described herein mounted on suitable anchor means 24, or alternatively the anchor means 29 of Figure 6. A suitable floor covering 76, for example vinyl,

is disposed on the floor 71 and this extends upwardly adjacent the wall 75. A window 60 is provided in a wall 75 comprising a header panel 66 and a lower panel 67.

A ceiling 32 is provided comprising a plurality of panels 10 and supported, in the example by suspension means 78 attached the roof structure 73, and/or by a connection 79 to the walls 72 of the outer shell 70. The upper ends of the walls 75 are received in, the present example, a head section 33 as shown in Figure 7 although of course a head section as shown in Figure 8 may be provided. The internal enclosure 74 provides no or minimal structural support to the outer shell 70 and within the internal structure 74 a suitable controlled environment having desired characteristics may be provided.

Where the interior of the hollow tongue 20 does not have a sufficient cross-section to accommodate the desired services, a duct means may be provided in a panel adjacent to the edge thereof as shown in Figure 16. Referring to Figure 16, a panel 100 is shown, comprising a first skin 111 and a second skin 112 separated by and bonded to an intermediate layer 113. In this example the intermediate layer comprises a synthetic plastic core, but may comprise an aluminium honeycomb core as described hereinbefore or any other suitable material as desired. Disposed along one edge of the panel 110 is a duct means 114. The duct means 114 is disposed between the first skin 111 and the second skin 112 and is preferably bonded thereto. A return 115, 116 of the first and second skins respectively extends over a part of the edge of the duct means 114. In the present example the returns 115, 116 are bent at an acute angle of 85° to the first and second skins respectively, in like manner to the returns 15, 16 shown in Figure 2. The part of the duct means 114 adjacent the returns 115, 116 is shaped accordingly. The duct means 114 is further provided at its midpoint with a recess 117 to receive a tongue 118, in the present example comprising aluminium.

A panel like that of Figure 15 is shown at 10, although a panel according to any alternative of the invention may be used. A retaining part 119 is located in a groove 120 provided in the panel 10. Advantageously, the retaining part 119 is of like structure to the retaining part 58, 65. The retaining part 119 has a recess 121 of like dimension to recess 117 to receive the tongue 118 to join the panel 10 to the panel 100. Alternatively, where two panels 100 are disposed adjacent to one another, the tongue 118 may be received in the recesses 117 of the duct means 114 of each panel.

In the present example, the duct means comprises an aluminium extrusion, although any suitable material or duct means may be used as desired.

The features disclosed in the foregoing description, or the following claims, or the accompanying drawings, expressed in their specific forms or in terms of a means for performing the disclosed function, or a method or process for attaining the disclosed result, as appropriate, may, separately, or in any combination of such features, be utilised for realising the invention in diverse forms thereof.

CLAIMS:

1. A frameless panel comprising a first skin and a second skin, the first skin and second skin being attached to and separated by an intermediate layer, the intermediate layer being provided with a groove on at least a pair of opposed edges of the panel.
2. A frameless panel according to claim 1 wherein at least one of said first skin and second skin comprise at least one steel element.
3. A frameless panel according to claim 1 or claim 2 wherein the intermediate layer comprises a rigid core material.
4. A frameless panel according to claim 3 wherein the intermediate layer is fire resistant and/or non-combustible.
5. A frameless panel according to Claim 3 or Claim 4 wherein the intermediate layer comprises a foam plastics material.
6. A frameless panel according to Claim 3 or Claim 4 wherein the intermediate layer comprises an aluminium honeycomb core.
7. A frameless panel according to any one of the preceding claims wherein a groove extends along at least three edges of the panel.
8. A frameless panel according to claim 7 wherein grooves extending along different edges of the panel are of different depths.

9. A frameless panel according to any one of the preceding claims wherein at least one of the first skin and the second skin comprises a return which extends over at least a part of one of the edges of the panel.
10. A frameless panel according to any one of the preceding claims comprising duct means extending along one edge thereof
11. A frameless panel as described herein with reference to the accompanying drawings.
12. A connection means in or for an assembly of a first panel and a second panel, the panels being located with mutually facing edges adjacent one another, each of said mutually facing edges comprising a groove, the connection means comprising a tongue, a part of said tongue being received in each of said grooves, to resist transverse displacement of the panels, the tongue being hollow.
13. A connection means according to claim 12 wherein the tongue is made of an electrically insulating material.
14. A connection means according to claim 12 or claim 13 wherein the tongue is made of a synthetic plastics material.
15. A connection means according to Claim 12 wherein the tongue comprises a fire resistant and/or non-combustible material.
16. A connection means according to Claim 15 wherein the tongue comprises aluminium.

17. A connection means according to any one of claims 12 to 16 wherein the first panel and the second panel comprise frameless panels according to any one of claims 1 to 11.

18. A connection means according to any one of claims 12 to 17 wherein the first panel and the second panel are bonded together.

19. A connection means according to claim 18 wherein the panels are bonded together with a PVC solvent or other flowable sealant.

20. A connection means as described herein with reference to the accompanying drawings.

21. An internal structure for a building having a structurally autonomous outer shell, said internal structure comprising a plurality of panels.

22. An internal structure according to claim 21 wherein at least one of the panels comprises a frameless panel according to any one of claims 1 to 11.

23. An internal structure according to claim 21 or claim 22 wherein the panels are connected with a connection means according to any one of claims 12 to 19.

24. An internal structure according to claim 21 or claim 22 or claim 23 wherein the internal structure comprises a wall comprising at least one of said panels, wherein a locating element is attached to a floor of the building and the locating element is received in a groove disposed along the lower edge of said panel.

25. An internal structure according to claim 24 wherein the wall panel is provided with a skirting.
26. An internal structure according to any one of claims 21 to 25 wherein the internal structure comprises a ceiling, said ceiling comprising at least one frameless panel.
27. An internal structure according to claim 26 where dependent on claim 24 or claim 25 wherein the wall panel is received in a head section disposed attached to the ceiling, the head section comprising a generally channel shaped part, the upper surface of the wall panel being received in said head section, wherein a seal is disposed between the wall panel and the head section.
28. An internal structure according to claim 27 wherein the seal is a wet seal or a dry seal.
29. An internal structure according to claim 27 or claim 28 wherein the head section is provided with a retaining structure to maintain the seal in place.
30. An internal structure according any one of claims 26 to 29 where dependent directly or indirectly on claim 20 wherein a part of the wall adjacent to said ceiling may be provided with coving.
31. An internal structure according to any one of claims 21 to 30 wherein the internal structure comprises a door or window, the said door or window comprising a frame element having a projection, said projection being receivable in a recess provided on a panel adjacent to said frame to receive said projection.

32. An internal structure according to claim 31 wherein the recess is provided within a retaining part disposed within the groove, said retaining part being adapted to receive said projecting part.

33. An internal structure according to claim 32 wherein dependent directly or indirectly on claim 24 wherein the retaining part has the same structure as the locating element.

34. An internal structure as described herein with reference to the accompanying drawings.

35. Any novel feature or novel combination of features described herein and/or in the accompanying drawings.



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Claims searched: 1-11

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Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:
UK CI (Ed.R): E1D DCF, DLEKMNW, DLEKMSV, DLEKMNW, DLEKMSW
Int CI (Ed.7): E04C
Other: Online: EPODOC, WPI, JAPIO

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2129465 A (G. Maunsell & Partners) Note fig 2 and page 2, lines 81-84.	1, 3 and 5
X	GB 1133035 (J. W. Elischer) Whole document.	1, 3 and 5
X	US 5628158 (W. H Porter) Note fig 35, metal elements (334a, b), fig 1, (42) and column 12, lines 9-47.	1-5 and 7

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.